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Magnetism and Superconductivity in $\text{Ru}_{1-x}\text{Sr}_2\text{GdCu}_{2+x}\text{O}_{8-d}$ Compounds*

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The properties of the newly discovered series of $\text{Ru}_{1-x}\text{Sr}_2\text{GdCu}_{2+x}\text{O}_{8-d}$ superconductors (maximum $T_c=72$ K for $x=0.4$) are reviewed with emphasis on their magnetic properties. The weak ferromagnetism of superconducting, parent $\text{RuSr}_2\text{GdCu}_2\text{O}_8$ ($T_c=45$ K, $T_N=131$ K), traced through *ac* susceptibility, magnetization and zero-field muon-spin rotation (μSR) experiments, is always enhanced when compared to its non-superconducting counterpart ($T_N=136$ K). For the whole series, the low temperature magnetization shows a significant contribution of the paramagnetic system of Gd ions. The μSR measurements reveal the presence of magnetic transitions with T_M between 2 K and 13 K for $0.4 < x < 0.1$ compositions that can be assigned to the response of the Ru/Cu sublattice. The Hall effect, thermopower and XANES data show an increase in carrier density and Cu valence with x . The effect of changing oxygen concentration, while not observed for $x=0$, lead to a change of T_c from 0 to 72 K for $x=0.4$.

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